reported that seedling densities of *Acacia* species become dominant after fire. However, the understanding of the influence of smoke on seed germination and seedling growth is very limited. In this study, the species of *Acacia* tested were *A. hebeclada*, *A. mearnsii* and *A. robusta*. Results show that seeds of *A. hebeclada* germinated under different light conditions with a smoke-derived butenolide solution (10^{-7} M), exhibited a significantly greater germination percentage than untreated seeds. *A. mearnsii* seeds exposed to constant dark conditions showed a significantly better germination percentage than the dark control. However, there was a non-significant improvement in germination for *A. robusta* seeds. All three species responded positively to the butenolide treatment after incubating for 10 days under constant dark conditions at 25±0.5 °C, achieving a higher vigour index and seedling mass in comparison to the controls. Smoke–water (1:500) had an intermediate effect on these species. This study shows that the butenolide, isolated from smoke, may have a significant effect on the post-fire seedling ecology of *Acacias*. In addition, soil sowing experiments indicate the possible use of smoke solutions to stimulate seed banks of highly invasive species *A. mearnsii*.

doi:10.1016/j.sajb.2007.02.070

Is species richness multifractal? Lessons from the Protea Atlas

H. Laurie [a], E. Perrier [b]
[a] *Maths and Applied Maths, University of Cape Town, Private Bag, Rondebosch 7701, South Africa*
[b] *IRD, UR GEODES, France*

Multifractals are densities that show detail at all scales. For species richness, this means that, at every scale, areas of high richness will have nearby areas of low richness. We present a very simple model for simulating such a pattern, and show that the model captures many aspects of the richness of Proteaceae in the Cape Floristic Region. The main implication is that the classic smooth functions of the SAR may be inadequate both for theory and for applications.

doi:10.1016/j.sajb.2007.02.071

A taxonomic study of the type section of the genus *Lebeckia* Thunb. (Fabaceae, Crotalarieae)

M.M. Le Roux, B.-E. Van Wyk, M. Van der Bank
Department of Botany and Plant Biotechnology, University of Johannesburg, PO Box 524, Auckland Park 2006, South Africa

A taxonomic study of the type section of the genus *Lebeckia* Thunb. (sect. *Lebeckia*; syn. *Eu-Lebeckia* Benth., *Phyllodiastrum* Walp.) is presented. The genus was last revised in 1862 by Harvey and consists of some 33 species. *Lebeckia* section *Lebeckia* is endemic to the Cape Floristic Region and consists of 14 species that differ from all others by their simple, acicular leaves. Based on fruit morphology, four informal species groups have been distinguished: (1) the *L. sepiaria* group (4 spp.) — fruit terete or semi-terete, ±sessile, (2) the *L. plukenetiana* group (6 spp.) — fruit stipitate, flat, (3) the *L. pauciflora* group (2 spp.) — fruit stipitate, semi-terete, and (4) the *L. wrightii* group (2 spp.) — fruit flat, ±sessile. An analysis of morphological characters revealed the existence of two undescribed species, namely "*L. brevipes*" M.M. Le Roux and B-E. Van Wyk *sp. nov. ined*., (hitherto confused with *L. longipes* Bolus and *L. pauciflora* Eckl. and Zeyh.) and "*L. brevicarpa*" M.M. Le Roux and B-E. Van Wyk *sp. nov. ined*., [previously confused with *L. sepiaria* (L.) Thunb.]. Diagnostic characters, nomenclature, typification and distribution maps of the species are discussed and illustrated, as well as the relationships within the section based on molecular and morphological data.

doi:10.1016/j.sajb.2007.02.072

Fine-scale variation in the spatial association of plant species: A test of the stress-gradient hypothesis in the sub-Antarctic

P.C. Le Roux [a], M.A. McGeoch [a,b]
[a] *Department of Conservation Ecology and Entomology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa*
[b] *Centre for Invasion Biology, Stellenbosch University, Private Bag X1, Matieland 7602, South Africa*

The stress-gradient hypothesis (SGH) predicts that the importance of positive interactions increases along abiotic stress gradients. This hypothesis is well supported for plants in cold and windy alpine and arctic environments, but has not been tested at high southern hemisphere latitudes. We investigated the fine-scale spatial distribution of four dominant plant species across a scoria cone on Marion Island, to test if the SGH was supported for a location in the climatically extreme and species poor sub-Antarctic. A clear altitudinal abiotic stress gradient existed across the scoria cone, with lower temperatures, stronger winds and greater soil movement at higher altitudes. These abiotic patterns were matched by stronger interspecific spatial association at higher altitudes and in areas of lower vegetation cover. This suggests stronger interspecific facilitation under more stressful conditions, and supports the predictions of the SGH. Anisotropic spatial aggregation and association patterns suggest that species tend to grow and establish disproportionately in sheltered areas (i.e. in the lee of, or downslope of other established plants) where they are protected from the prevailing wind and sediment burial. Thus, at this site plants benefit from shelter from neighbouring plants, and the impact of this positive